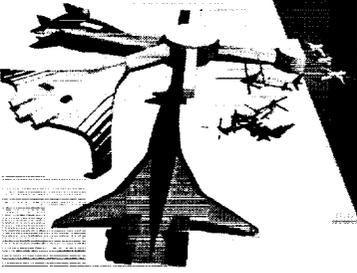


CONF Paper / 57 / IN 103

AvSTAR Workshop

Future Air Transportation System



Breakout Session Report

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09/22/00 AvSTAR - Future Air Transportation System 1

Overview

- AvSTAR Future System Effort Critically important
 - Challenge is real
 - Need to deliver
 - Already time critical
- Investment in the future
 - Protect from encroachment due to near term pressures
- Need to follow a systems engineering process
 - System must be integrated from the start
 - Tasks must be linked in the system concept
- Efforts need to be worked in worldwide context

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Areas



- Policy Issues
- System Attributes
- Concepts
- Metrics
- Research Issues

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Policy Issues



- General
 - Political and business commitment to action and implementation
 - Adopt vs. specifically develop technologies & methodologies
 - Examine other similar efforts - avoid duplication
 - ATN issues and spectrum availability
 - Harmonize air transportation with other transportation modes. Define the boundary of the system?
 - Integrated multi-modal
 - Door-to-door or gate-to-gate
 - Information management + system architecture
 - Do we have the national competency to do this job?

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System Attributes



- System Guidelines/Scope
 - Mission/goal driven research
 - Set realistic expectations
 - Account for differing views of system requirements
 - Passenger-centric vs. aircraft-centric vs. airline-centric vs. airport centric
 - System Characteristics/design constraints
 - Transitional and revolutionary
 - Concurrent transition planning
 - Layered system
 - Must be robust to sub-system failure/changing conditions
- System Performance Parameters
 - Safety
 - Reliability
 - Availability
 - Affordability
 - Adaptable to all aircraft types

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Concepts



- Concurrence on need for greater automation / movement away from current approach to sectorization of airspace as a means of improving traffic throughput
 - Automated Airspace (Erzberger)
 - Remove human as separation assurance monitor
 - Tactical control loop
 - Implications for automation
 - 4-D Dispersed Control
 - Computer strategic checking
 - Aircraft tactical separation
 - Separation based on collision risk management
 - Sector-less flight-based ATM
 - Same controller handles all flight phases
 - Highly Distributed Control
- Airport/Runway Technologies
 - Runway Independent Operations
- System-Level Considerations
 - System-level information management (emphasized)
 - Modeling must account for up to a "300,000" IAC (Instantaneous Airborne Count)
 - New airline business approaches
 - Review of prior concepts of operations
 - Impact of new technologies
- Weather
 - Future system automation must properly account for weather and uncertainty in its predictability

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Metrics



- Safety
 - Target level of safety (TLOS)
- Environmental impact
- Fleet coverage
- Door to Door
- Passenger Throughput
- Cargo Throughput
- Efficiency
- Capacity
- Etc...

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Research Issues (1)



- Modeling and Understanding
 - Methodology for evaluating concepts
 - Economic feedback loops
 - Reality test
 - Models
 - Benchmarking and understanding of current system
 - Dynamic behavior
 - Non-normal events (eg weather)
 - Inefficiencies
 - System-level modeling
 - Economic feedback
 - Controller limits
 - Safety analysis
 - Barrier to transition
 - System design issues
 - Partition and allocation of risk and responsibility
 - Understanding transition dynamics
 - Barriers
 - Robustness of large, distributed, highly-automated systems
 - Validation/certification
 - Software

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Research Issues (2)



- Technology Developments
 - Multiple objective-function optimization
 - Airborne Conflict Management
 - Intent
 - Weather integration in systems and research
 - Communications issues
 - Sensor issues

- Operational Issues
 - Develop confidence for re-allocation of separation responsibility to automation
 - Robustness and fall-back modes

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Detailed Research Example



- Automated Airspace (Erzberger)
 - Size of super-sector
 - » How big is the biggest?
 - Psychological impact on pilots
 - » Dealing with automation-provided ATC clearances
 - Mixed operations in automated airspace
 - » Transitional design issue
 - Communication infrastructure
 - » Not ATN? UMTS? Satellite-based?

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